Welcome to **Edition 32** of **P_2N_0** covering the drive to avoid, reduce and remove greenhouse gas (**GHG**) emissions to progress to net-zero GHG emissions (**NZE**).

P_2N_0 covers significant news items globally, reporting on them in short form, focusing on policy settings and legal and project developments and trends. This **Edition 32** covers news items arising during the period **May 17** to **May 31, 2025**.

Edition 33, covering **June 1** to **June 30, 2025**, will be published on **July 4, 2025**. Given the Northern Hemisphere summer we have decided to revert to the monthly publication cadence during Q3 2025.

P_2N_0 does not cover news items about climate change, M&A activity, or news items that are negative.

Access previous editions of **P_2N_0** at bakerbotts.com.

Content

News headlines from May 17 to May 31, 2025 (pages 1 to 2)	
News from Around the World	
1. Africa (**p. 2**)	2. Middle East, Central Asia, & South Asia (**p. 3**)
3. Americas (**p. 3** to **6**)	4. APAC (**p. 6** to **8**)
5. Europe and the UK (**p. 8** to **12**)	**Helpful Publications and Data Bases** (**p. 12** & **13**)
Baker Botts Team (**p. 13**)	

HEADLINES FROM MAY 17 TO MAY 31, 2025

Opening observations:

During the second two weeks of **May 2025** the following matters caught the eye:

- On **May 21, 2025**, the **International Energy Agency** (**IEA**) published the Global Critical Minerals Outlook 2025. The publication provides a comprehensive assessment of the market for **critical metals and minerals** (**CMM**) and **rare earth elements** (**REE**)[1], including relatively detailed outlooks for cobalt, copper, graphite, lithium, manganese, nickel, platinum metals, REEs, silicon, silver and uranium. Each outlook is worth a read.

  To provide some context, the good folk at **Elements** have produced Visualizing the Abundance of Elements in the Earth's Crust which indicates, among other things, that bauxite (aluminium) is the most abundant element found in the earth's crust (at 8.23%), followed by iron (5.6%), calcium (4.15%), sodium (2.36%), magnesium (2.33%), potassium (2.09%) and titanium (0.565%). Other **CMM**s and **REE**s are to be found with other elements comprising 0.48% of the earth's crust.

[1] **CMM**s are: **1**. Bauxite, High Purity Alumina, and Aluminum; **2**. Antimony; **3**. Beryllium; **4**. Bismuth; **5**. Cobalt; **6**. Copper; **7**. Gallium; **8**. Germanium; **9**. Graphite; **10**. Indium; **11**. Lithium; **12**. Magnesium; **13**. Manganese; **14**. Nickel; **15**. Niobium; **16**. Platinum metals; **17**. Rare Earths Elements (**REE**s); **18**. Silicon and Silicon metals; **19**. Tantalum; **20**. Titanium and Titanium metal; **21**. Tungsten; **22**. Uranium; and, **23**. Vanadium. **Edition 29** of **P_2N_0** defines **17 REE**s as follows: Cerium (Ce), Dysprosium (Dy), Erbium (Er), Europium (Eu), Gadolinium (Gd), Holmium (Ho), Lanthanum (La), Lutetium (Lu), Neodymium (Nd), Praseodymium (Pr), Promethium (Pm), Samarium (Sm), Scandium (Sc), Terbium (Tb), Thulium (Tm), Ytterbium (Yb) and Yttrium (Y).

In addition to outlooks for **CMM** and **REE**, the publication provides a clear narrative as to the need for **CMM** and **REE** for the purpose of the **three main** scenarios of the **IEA**. These scenarios are to be found in the **IEA** publication **World Energy Outlook 2024** and are as follows:

1. The **Stated Policies Scenario** (**STEPS**);

2. The **Announced Pledges Scenario** (**APS**); and

3. The **Net Zero Emissions by 2050** (**NZE**) **Scenario**.

Further, in **Chapter 3** of the publication, the implications of the analysis of supply and demand and each scenario are considered, including by reference to policy settings, regulation and legislation. These implications should be read with the **CSIS** (at https://www.csis.org, under G7 Cooperation to De-Risk Minerals Investments in the Global South) report in mind.

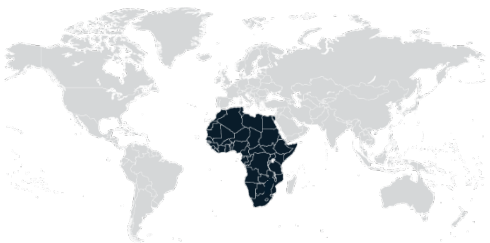
By way of reminder: **Edition 31** of **P_2N_0** reported on the **CSIS** report as follows:

"**CSIS** reports on the progress that has been made by **China** across the **Global South** (and the means that China has to mitigate risks) and hazards the view that there may be benefit in **G7** countries working together to derisk the level of investment needed to develop secure **CMM** supply chains.

CSIS states that the level of combined investment for these purposes is **USD 590 billion** to **USD 2 trillion** by **2040**: the actual level of investment provided by **G7 governments** is in the region of **USD 13 billion**. The good folk at **CSIS** suggest that the **G7** should establish a **G7 Critical Minerals Investment Fund**, and recounts the existing **G7 initiatives**: The Partnership for Global Infrastructure and Investment (**PGI**); and The Minerals Security Partnership (**MSG**), both championed by the Biden-Harris Administration.

Finally, **CSIS** provides some sound thinking (thinking long advocated by a good number of folk): **Pooling of capital** by **G7** member states; **Selection of strategic projects** to allow the development of supply chains to make use of refining and production capacity; and **Offtake agreements** signed by members of **G7** under which **G7** members function as wholesale buyers of **CMM**."

Finally, to accompany the publication is the IEA Critical Minerals Data Explorer.

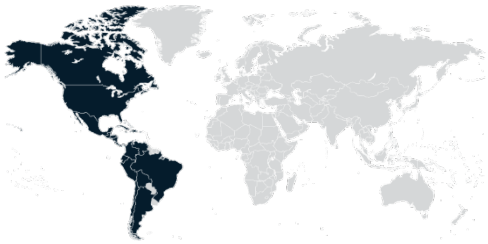


Africa

After a good deal of news relating to Africa in **Editions 29**, **30** and **31** of **P_2N_0** there were no significant new news items to report for the purposes of this **Edition 32** of **P_2N_0**.

Middle East, Central Asia, and South Asia

UAE Federal Decree-Law No. 11 has gone live: On **May 30, 2025**, a new law became effective in the UAE mandating a number of requirements across the UAE, including governing greenhouse gas (**GHG**) measurement, reporting and verification and annual emission reductions. Click here to read the Decree in full.



Americas

- **US Department of Energy (DOE) cancels awards:** On **May 30, 2025**, the US **DOE** announced (at energy.gov, under Secretary Wright Announces Termination of 24 Projects, Generating Over $3 billion in Taxpayer savings) the termination of 24 awards of funding made by the **Office of Clean Energy Demonstrations** (**OCED**), totalling a little over **USD 3.7 billion**.

  The projects affected by this decision are:

Projects awarded funding			
Project	**Awardee**	**Funding** (each rounded)	**Location**
Replacement of furnace with four coreless induction furnaces to reduce GHG emissions in ductile iron pipe production	American Cast Iron Pipe Co	USD 75 million	Birmingham, Alabama
Production of cement using alternative low-carbon means	Brimstone Energy Inc	USD 189 million	Location to be determined
Commercial-scale CCS project to capture up to 2 million metric tons of CO_2 annually	Calpine Texas CCS Holdings	USD 270 million	Baytown, Texas
Utilisation of electric thermal energy storage (ETES) to remove need for natural gas	Diageo Americas Supply, Inc	USD 75 million	Shelbyville, Kentucky and Plainfield, Illinois
Construction of a large-scale molecular recycling facility to convert plastic waste into low-carbon, virgin-quality PET using renewable energy and thermal batteries	Eastman Chemical Company	USD 375 million	Longview, Texas
Low-carbon hydrogen and ammonia facility aiming to capture 98% of CO_2 emissions from ExxonMobil's Baytown plant	ExxonMobil Corporation	USD 332 million	Baytown, Texas

Hybrid electric furnace project to cut natural gas use by 70% and increase recycled content in glass bottle production process	Gallo Glass Company	USD 75 million	Modesto, California
CCS project to capture CO_2 arising cement at plant to enable permanent underground storage of over 50 million metric tons of CO_2	Heidelberg Materials	USD 500 million	Mitchell, Louisiana
Utilisation of electric boiler and microgrid system to eliminate GHG emissions from natural gas boilers	Kohler Co	USD 51 million	Casa Grande, Arizona
Clean energy upgrades at 10 food plants to reduce GHG emissions by over 99% using a range of technologies	Kraft Heinz Food Co	USD 180 million	10 locations to be determined
Replacement of four furnaces with two larger hybrid electric furnaces to reduce GHG emission by up to 60%	Libbey Glass LLC	USD 45 million	Toledo, Ohio
Net-zero cement plant using biomass fuels, calcined clay and carbon capture to eliminate nearly all CO_2 emissions	National Cement Co	USD 500 million	Lebec, California
On-site solar and battery systems to decarbonize gold mining operations	Nevada Gold Mines, LLC	USD 95 million	Eureka Country, Nevada
Installation of new drying and baling line and pulper feed system to reduce GHG emissions in packaging production	Nippon Dynawave Packaging	USD 46 million	Longview, Washington
Large-scale e-methanol plant using renewable power and captured CO_2 to produce low-carbon fuel	Orsted Star P2X LLC	USD 99 million	Chambers Country, Texas
Rebuild of a glass furnace with new technologies to reduce GHG emissions	Owens-Brockway Glass	USD 57 million	Zanesville, Ohio
Carbon capture pilot project to advance CO_2 removal technology at combined-cycle generation facility	PPL Corporation	USD 72 million	Louisville, Kentucky
Carbon capture pilot demonstrate new technology to capture 120,000 metric tonnes of CO_2 place in geologic storage	Research Triangle Institute	USD 4 million	Vicksburg, Mississippi
Installation of a first-of-its-kind industrial steam-generating heat pump to cut 20,000 tons of CO_2 annually	Skyven Technologies Inc	USD 15 million	Medina, New York
First commercial-scale, fossil-fuel-free cement plant using an electrochemical process to produce zero-carbon cement	Sublime Systems	USD 87 million	Holyoke, Maine
Commercial-scale CCS to capture and to store permanently up to 1.75 million metric tonnes of CO_2 annually	Sutter CCS LLC	USD 270 million	Yuba City, California
Commercial-scale project to combine capture CO_2 (from ethylene production) with low-carbon hydrogen to produce sustainable ethanol and ethylene	Technip	USD 200 million	Gulf Coast to be determined
Large-scale pilot using a sorbent based post-combustion CO_2 capture system to capture 158,000 metric tonnes of CO_2 annually from coal power plant	TDA Research Inc	USD 49 million	Gillette, Wyoming

Replacement of a coke-fired furnace with electric induction furnaces to reduce GHG intensity by 73%	United States Pipe and Foundry Company	USD 75 million	Bessemer, Alabama

The implications of the cancellation of funding for each of these projects will become apparent in time. Those regular readers of **P_2N_0** will recall the coverage of the Baytown Projects of **Calpine** and **ExxonMobil**.

By way of reminder recent editions of **P_2N_0** have covered the **Baytown Projects** as follows:

- **Edition 31** of **P_2N_0** reported (under **ExxonMobil and Marubeni sign BH_2 offtake**) that: "**ExxonMobil** and **Marubeni Corporation** had entered into an offtake agreement under which **ExxonMobil** is to supply and **Marubeni** is to offtake **250,000 metric tonnes** of **blue hydrogen** (**BH_2**). The **BH_2** will be supplied from **ExxonMobil's Baytown Project**, on the **Gulf Coast**."
- **Edition 30** of **P_2N_0** reported (under **ExxonMobil and Calpine sign CO_2 T&S deal**) that: "On **April 25, 2025**, it was reported widely that **ExxonMobil** had signed an agreement with **Calpine Corporation** for the transportation and storage of up to **2 million metric tonnes** of **CO_2** a year. This is one of a number of agreements that **ExxonMobil** has signed (after CCS offtake agreements with **NG3**, **CF Industries**, and **Nucor**), bringing its total contracted carbon storage volume to around 16 million metric tons per year."

It is likely too early to determine whether the cancellation of funding will impact these matters, in particular noting that as at the end of **May 2025** it seemed that the blue hydrogen projects may continue to be able to benefit from a tax credit under the Inflation Reduction Act.

- **US BOEM approves request for deep-sea exploration**: On **May 21, 2025**, **Impossible Metals** (at https://impossiblemetals.com, under BOEM approves Impossible Metals' Deep-Sea required in US Federal waters) announced that the US **Bureau of Ocean Energy Management** (**BOEM**) has approved the request from **Impossible Metals** to allow it to seek a lease to explore for metals and minerals offshore of **American Samoa**. Our understanding is that this is the first request of this kind under the **Outer Continental Shelf Lands Act 1953**.
- **California on a roll**: On **May 20, 2025**, at **7.45pm, 10 GW** of electrical energy from BESSs was dispatched across the California grid. It is our understanding that this was a first.
- **Rio Tinto rolls**: On **May 20, 2025**, the **Argentinian Government** approved the development of the **USD 2.5 billion** lithium **Rincon Project** by **Rio Tinto**. The **Rincon Project** is in the northern province of **Salta**.
- **Empire has wind in its sails**: On **May 19, 2025**, the **US Federal Government** lifted its moratorium on the development of the **800 MW Empire Wind I** offshore wind field development project. Construction of the **Empire Wind I** OWF project can now continue.
- **Mexico well-placed to progress energy security using renewables**: On **May 18, 2025**, the good folk at **Ember** published Renewables point the way to Mexico's energy security.

  The publication is a pithy and punchy read, mapping the way for Mexico to achieve energy security through the development of renewable electrical energy, and, in so doing, reduce its reliance on imported hydrocarbons.

- **Meta data center plan**: On **May 17, 2025**, the plans of Meta to develop a **USD 10 billion** 4 million square foot campus to house what will be Meta's largest data center in the Richmond Parish, Louisiana, were the subject of considerable coverage.

  As with all data centers, assurance around supply of electrical energy is core to any final investment decision.

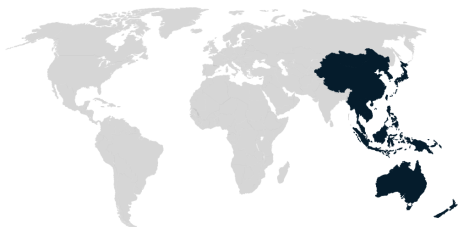
  To provide assurance around supply, **Entergy** proposes to develop **2,260 MW** of new gas-fired capacity (from three new gas fired power plants) to enable it to supply electrical energy to **Meta**.

  In the context of debate around the GHG emission footprint of this new gas-fired generation capacity, **Meta** has indicated that it will develop up to 1,500 MW of new photovoltaic solar capacity and accompanying **BESS**.

  What is emerging is that the use of carbon capture technology to capture and store CO_2 arising from the combustion of natural gas to generate electrical energy is at a level that does not make its use financially viable at the moment.

  On **May 23, 2025**, the President of the US signed executive orders —specifically, Ordering the Reform of the Nuclear Regulatory Commission, Reforming Nuclear Reactor Testing at the Department of Energy, Deploying Advanced Nuclear Reactor Technologies for National Security and Reinvigorating the Nuclear Industrial Base — intended to provide a clear and timely pathway for the development of nuclear energy generation capacity, including to facilitate the mining and enrichment of uranium and the development of new nuclear reactors with a focus on small modular reactors (**SMRs**).

  It is understood that the initiatives will allow the development of SMRs so as to contribute to the mix of electrical energy required to match increased demand for electrical energy, including from data centers as their demand increases for the purposes of AI.



APAC

- **EMA grants further conditional licence for import of electrical energy**: On **May 30, 2025**, the **Energy Market Authority** (**EMA**) of Singapore granted a conditional licence to **Singa Renewables** (a joint venture between **RGE** and **TotalEnergies**) in respect of the import of renewable electrical energy from Riau Province, Indonesia, to Singapore.

  By way of reminder: In September 2024, the EMA granted its first five conditional licences for electricity imports from Indonesia, totalling 2 GW, to **Pacific Medco Solar Energy Pte. Ltd.**, **Adaro Solar International Pte. Ltd.**, **EDP Renewables APAC**, **Vanda RE Pte. Ltd.**, and **Keppel Energy Pte. Ltd.** In the same month, **Singa Renewables Pte. Ltd.** and **Shell Eastern Trading (Pte.) Ltd** also received conditional approvals for a further 1.4 GW of imports from Indonesia. These projects have since progressed through marine surveys and feasibility studies, with **Singa Renewables Pte. Ltd.**

advancing from conditional approval to conditional licence status in May 2025 as described above.

- **Eligible carbon credit roll-over**: On **May 30, 2025**, **The Straits Times** (at www.straitstimes.com, under Carbon-tax paying firms can carry over unused offsets to 2025 due to limited carbon credit supply) reported that corporations in Singapore liable to pay carbon tax and that would have been able to use eligible carbon credits to discharge up to 5% of their liability, will be able to roll-over any unused entitlement to use eligible carbon credits for 2024 and 2025. The reason for this is that there have been insufficient eligible carbon credits available to allow their use.
- **Indonesia has new RUPTL**: On **May 26, 2025**, the **Ministry of Energy and Mineral Resources** (**MIMR**) issued the Electricity Supply Business Plan (RUPTL) 2025 - 2034. The **RUPTL** is based on the **National Energy Policy** (**KEN**) and the **National Electricity General Plan** (**RUKN**).

  While there are many points to note, the headlines are as follows:

  - An additional 69.5 GW of generation capacity is planned:
    - 75% of which will be renewable energy (42.6 GW), and associated electrical energy storage, including BESS and pumped storage (10.3 GW):
      - the 42.6 GW of renewable energy will comprise: photovoltaic solar – 17.1 GW, hydroelectric – 11.7 GW, Wind – 7.2 GW, Geothermal – 5.2 GW, Bioenergy – 0.9 GW, and Nuclear 0.5 GW (comprising two new build 250 MW nuclear power stations); and
      - the 10.3 GW of electrical energy storage will comprise 6 GW of pumped storage and 4.3 GW of BESS; and
    - with the balance (of 16.6 GW) to be non-renewable, with 10.3 GW of gas-fired capacity and 6.3 GW of coal-fired capacity.
  - The new electrical energy generation capacity is to be undertaken across Indonesia.
  - The augmentation and expansion, and development of new transmission infrastructure will be essential. Over the period covered by the RUPTL, PLN has scheduled the development of around 47,000 kms of transmission lines and an increase in substation capacity by 107,950 MVA.
  - The increased electrification across Indonesia.

  While we have provided the headlines, the RUPTL is well-worth a read (and a re-read).
- **Major copper find**: On **May 28, 2025**, the good folk at earth.com (at www.earth.com, under Discovery of a 20 million ton copper super deposit) reported that a copper discovery of well in excess of 20 million metric tonnes has been discovered in the **Qinhai-Xizang** region of **China**.
- **ENEOS and Honeywell to develop MCH transport system**: On **May 25, 2025**, it was reported that **ENEOS** and **Honeywell** are to develop a transport system to transport hydrogen vector **Methylcyclohexane** (**MCH**). **MCH** is an excellent hydrogen energy vector produced by the combination of toluene and hydrogen. The hydrogen is extracted from **MCH** by dehydrogenation. It is understood that **ENEOS** refineries will deploy dehydrogenation facilities to extract hydrogen from the **MCH**.

- **Taiwan not turning away from nuclear**: During **mid-May 2025** (at about the same time that Belgium was repealing its 2003 legislation – see below), there was coverage of whether **Taiwan** should shutter its final operational nuclear power plant. As reported, Taiwan is expecting demand for electrical energy to increase by up to 15% by 2030, critically, because of increased use of AI. In this context, the legislature in Taiwan amended legislation to allow the extension of the life of the nuclear power plant.
- **Mining and Mine Tailings in Asia**: During **May 2025** the author read an excellent publication, Mining and Mine Tailings in Asia – Moving towards adoption of the Global Industry Standard on Tailings Management, authored by **GRID-Arendal** in partnership with **UNEP**. The publication is specific to jurisdictions, and mines, with which I am familiar. The publication is excellent, with a particularly welcome balance in its coverage. There is increasing focus on tailings as a mining operation issue, and the economic and safety benefits of getting it right.
- **PV solar installations soaring in China**: During **May 2025** it is apparent that China exceeded **1TW** of installed photovoltaic capacity. The rate of installation of photovoltaic solar capacity appears to be increasing with over 100 GW of capacity installed to the end of April 2025 for the current calendar year, and 45 GW installed during April 2025. While the reason for this rate of installation may be tied to the change in pricing structure from June onwards, the rate of progress leads the progress being made by the rest of the world combined.

  By way of reminder: Edition 31 of P_2N_0 reported (under **China's Q1 GHG emissions fall**) that:

  "During the first quarter of 2025 GHG emissions declined by **1.6%** across China, and **5.5%** across the power sector in China, year-on-year (compared to Q1 of 2024). This decline is notable of itself and because year-on-year electrical energy consumption across China increased by 2.5%. Among other things, what this indicates is that the rate of development of renewable electrical energy capacity is such that it is exceeding the rate of increase in electrical energy consumption".

Europe and the UK

- **EU (nearly) on track to achieve 2030 GHG emission targets**: On **May 28, 2025**, the **European Community** published **COM (2025) 274 titled** EU-wide assessment of the final updated national energy and climate plans Delivering the Union's 2030 energy and climate objectives. The report provides an assessment of progress being made to achieving the **GHG** emission targets, concluding that it is on target (nearly) to achieve a reduction on **GHG** emissions of 55% compared to 1990 and a 42.5% share of electrical energy to be generated from renewable resources. At current rates of progress, the reduction in GHG emissions will be around 54% and the renewable share will be 41%. This may be regarded as positive news.

- **Hyper-scaling**: On **May 27, 2025**, **energystorage** (at https://www.energy-storage.news, under Construction approval for 1.6GWh flow battery in Switzerland: "about time we brought this scale to Europe") reported that **FlexBase Group** is to commence the development of data centre having received development approval for the **Laufenburg Technology Center** (**TZL**). Part of the power supply solution for TZL is the use of an 800 MW / 1,600 MWh redox battery or redox flow battery.
- **CBAM SPAM**: On **May 22, 2025**, the **European Parliament** voted (564 to 20) to approve amendments to the **Carbon Border Adjustment Mechanism** (**CBAM**) to reduce the number of corporations and other organizations importing goods into the European Union. As previously reported, the European Commission's Omnibus I package proposed a new 50-tonne threshold for CBAM, which would exempt 90% of importers—primarily small and medium-sized enterprises—from the regulation, while still covering over 99% of emissions from iron, steel, aluminium and cement imports.
- **EU oil and gas producers to provide CO_2 storage solutions:** On **May 21, 2025**, the **European Commission** adopted a Delegated Regulation (Commission Decision specifying the pro-rata contribution to the Union CO_2 injection capacity objective by 2030 from entities holding an authorisation as defined in Article 1, point 3, of Directive 94/22/EC of the European Parliament and of the Council) under which it prescribes the oil and gas producers, and their respective proportionate obligations, to contribute to 50 million metric tonnes of CO_2 storage capacity by **December 31, 2030** in proportion to their production of oil and gas from 2020 to 2023. The forty-four oil and gas companies are listed in Annex 1 and each has an obligation for these purposes.
- **Northwest European Hydrogen Monitor 2025**: On **May 21, 2025**, the **IEA** published its Northwest European Hydrogen Monitor 2025. The thesis of the publication is that: "Northwest Europe is at the forefront of the low-emission hydrogen development". Whatever one's view of the temporal element to this thesis, the Northwest region of Europe has potential to become a key production and use hub.

  The publication analyses Austria, Belgium, Denmark, France, Germany, Luxemburg, the Netherlands, Norway, Switzerland and the UK, and in so doing defines the IEA's description of Northwest Europe.

  For those active in the region, the findings of the publication will not be a surprise: **1.** The policy settings and regulatory framework has continued to evolve; **2.** Greater attention is required to create demand of low-emission hydrogen to match supply [Note: As reported below, this is on the agenda for the European Commission]; **3.** While the production of low-emission hydrogen could reach 8 million metric tonnes across the region by 2030, less than 8% of projects are at an advanced stage of development; **4.** While the region is at the centre of the electrolyser industry in Europe, electrolyser manufacturers are facing continued challenges; **5.** The cost of the production of renewable electrolytic hydrogen needs to reduce significantly to allow competition with unabated natural gas derived hydrogen; **6.** "Ensuring the effectiveness of hydrogen support mechanisms requires a holistic and cross-regional approach"; **7.** The region is well-placed to play a role in the development of the trade in low-emissions hydrogen globally; **8.** While firm investment remains a key point, the region could develop a 13,000 km pipeline network by the early 2030s; and 9. Underground storage will be key to achieving efficient management of supply and demand.

  For the previous two editions of the **Northwest European Hydrogen Monitor** click here**.** What will be apparent from reading the three editions together is that what is needed is known and has been since the first edition.

- **EU Hydrogen Bank second auction results**: On **May 20, 2025**, the **European Union** (**EU**) announced the results of the second auction for **RFNBO Hydrogen** in the Results of the IF 24 RFNBO Hydrogen Auction. The second auction was seeking to procure **RFNBO Hydrogen** in a general category and in a maritime category.

  As announced, **61 bids** were received from **10** different **European Economic Area** (**EEA**) countries[2] amounting to **6.3 GWe** of electrolyser capacity, with a total bid value of **€4.48 billion** in the general category and **€399 million** in the maritime category. For further narrative, click through to https://europa.eu.commission, under Nearly € billion awarded to boost development of renewable hydrogen and https://climate.ec.europa.eu, under Clean Industrial Deal.

  Under the **general category** 12 projects were successful in their bids as follows:

	Project name	Coordinator	Location	Bid Price	Bid Mass	Electrolyser Cap (MWe)	Source of electrolyser	GHG avoided: 10 years	Total Funding in m €
1	Villamartin H_2	Galena	Spain	€0.2/kg	126,000	252	Denmark/PRC	859,000	25.115
2	Puerto Serrano H_2	Galena	Spain	€0.25/kg	49,000	98	Denmark/PRC	337,000	12.307
3	Kristinestad PtX	Koppo Energia	Finland	€0.33/kg	258,000	200	Germany	1,763,000	85.007
4	SolWinHy Cadiz	Viridi RE GmbH	Spain	€0.4/kg	63,000	80	USA	431,000	25.183
5	H_2LZ	Ignis Hydrogeno	Spain	€0.41/kg	26,000	20	USA	179,000	10.720
6	AGS	Armonia Green	Spain	€0.41/kg	238,000	198	Germany	1,631,000	97.739
7	AGG280	Armonia Green	Spain	€0.42/kg	238,000	198	Germany	1,629,000	100.040
8	H2CRI	Green Devco	Spain	€0.44/kg	30,000	30	Germany	204,000	13.136
9	KASKADE	Meridiam SAS	Germany	€0.45/kg	354,000	367.50	Germany	2,424,000	159.451
10	H_2-Hub Lubmin	H_2-Hub Lubmin	Germany	€0.47/kg	238,000	210	Germany	1,628,000	111.860
11	Torde SillasH2	Elawan Energy	Spain	€0.48/kg	17,000	15	USA	115,000	8.081
12	Zeevonk Electrolyser	Zeevonk Electrolyser	Netherlands	€0.6/kg	411,000	560	Germany	2,812,000	246.650

  Under the **maritime category** three projects were successful in their bids as follows:

	Project Name	Coordinator	Location	Bid Price	Bid Mass	Bid Cap (MWe)	Source of electrolyser	GHG avoided: 10 years	Total Funding in m €
1	RjukanH2	Norwegian Hydrogen	Norway	€0.45/kg	29,000	19	Norway	201,000	13.203
2	Gen2-LH2	Gen2 Energy-AS	Norway	€0.59/kg	104,000	82	Germany	714,000	61.590
3	HammerfestH2	Green HAS	Norway	€1.88/kg	12,000	7.5	USA	80,000	21.6882

[2] The EEA States comprise the 27 EU Member States and the three European Free Trade Association Member States, Iceland, Liechtenstein, and Norway.

Total funding of **€992 million** was awarded across 15 projects. The funding will be sourced from the EU **Innovation Fund**. In turn, the **EU ETS** provides the revenue for the **Innovation Fund**.

In addition to the funding from the **Innovation Fund**, it is understood that **Austria**, **Lithuania** and **Spain** have allocated up to **€836 million** in funding for projects in their countries under Auctions-as-a-Service.

By way of background: Edition **22** of **P_2N_0** reported on the results from the first auction for RFNBO Hydrogen as follows: "The first **European Hydrogen Bank (EHB)** auction received **132** bids from **17 countries** for the award of contracts to supply hydrogen under the first auction undertaken by the **EHB**. Ahead of schedule in late **March 2024**, the seven successful bidders were announced. Through the auction process the **EU** agreed to provide **€720 million** in funding (from the Innovation Fund) to bridge the gap between the cost of the production of renewable hydrogen and equivalent fossil fuel. As reported, bid prices ranged from €0.37 per kg to €4.5 per kg (€4.50 per kg being the cap on the bid price). The bid prices of successful bidders were low, surprisingly so, with the lowest bid being €0.37 a kilogram of renewable hydrogen. What is telling about the successful bid prices was that they were similar. Click here for a list of the six projects."

The third auction is planned to commence in Q4 2025.

Finally, picking up on a point made consistently in P_2N_0, government needs to coordinate the supply side with the demand side. It is understood that the European Commission is in the throes of finalising thinking for the HydrogenMechanism to be administered by the European Hydrogen Bank to facilitate trading among sellers and buyers.

- **Dutch Doubling Up - photovoltaic solar and wind**: On **May 20, 2025**, there was considerable coverage of the commencement of the development of the **Hollandse Kust Noord** offshore wind field development in the Dutch sector of the North Sea. This is the world's first high wave floating photovoltaic solar and offshore wind field project, with the floating photovoltaic solar capacity anchored to the seabed. It is foreseeable that this configuration will become a model for increased power generation.
- **Belgium's new clearer agenda**: On **May 15, 2025**, the **Chamber of Representatives** in **Belgium** voted in favour (102 votes in favour, eight votes against, and 31 abstentions) of the repeal of 2003 legislation that prevented the development of new nuclear power within the country and provided for the shuttering of seven existing nuclear power plants. With the repeal of the 2003 legislation the first order of business will be to extend the lives of the nuclear power plants.
- **Denmark and Norway lay down markers:** On **May 19, 2025**, **Denmark** and **Norway** outlined changes to their offshore wind field (OWF) auction processes.
  - **Denmark:** For the purposes of retendering **3 GW** of **OWF** capacity (in respect of which no bids were received in **December 2024**), across three sites:
    - Bidders will be allowed to bid for government funding support in the form of two-sided contracts for difference;
    - The Government of Denmark will fund the costs of investigations and surveys necessary to develop each of the three sites;

- The times permitted for the development of the OWF capacity at each of the three sites will be flexible;
- The criteria for selecting the successful bidders will be based on price only; and
- There is no requirement for equity participation by the State of Denmark.

- **Norway:** For the purposes of tendering OWF capacity the focus will be on floating offshore wind field development, applying a **two-step process**: **Step 1** will apply qualitative criteria for selection for involvement in **Step 2**, and under **Step 2** those selected on the qualitative criteria will bid for direct grant funding from the Government of Norway.

HELPFUL PUBLICATIONS AND DATA BASES

In addition to publications covered by this edition of **P_2N_0**, the most noteworthy publications read by the author during the second two weeks (and a bit) of **May 2025** are:

- **Biogas and Biomethane global assessment**: In the final week of **May 2025**, the **IEA** published Outlook for Biogas and Biomethane – A global geospatial assessment. The potential of biogas (methane sourced from biomass) has long been discussed, and in recent times, the use of biogas that has been processed / scrubbed to produce biomethane (in effect natural gas from a biological not fossil fuel source) has gained attention. The publication from the **IEA**, is a first: it provides the first global analysis of "the untapped potential of biogas" from biomass sources, including agriculture, municipal solid waste (including in situ in landfill), and residues from forestry and husbandry activities.

  The analysis provided by the publication is helpful in that it canvasses the possible sources of biomass and the potential to derive biogas and biomethane. The publication does not, however, canvass the key issue for a biogas and biomethane project (other than from MSW and animal and human waste), the economics of collection. This is not to be critical of the publication, rather this observation is born out of having worked on several biogas projects using differing technologies.

- **Preparation of the energy transition**: During **May 2025** the good folk at **Beyond Fossil Fuels**, **Institute for Energy Economics and Financial Analysis**, **E3G** and **Ember** published How Europe's grid operators are preparing for the energy transition – A snapshot of electricity transmission system operator practices and plans. The publication is well-worth a read for those active in the sector, both within Europe and globally.

- **Visual Capitalist – The World's Carbon Emissions**: The author keeps an eye out for all visuals from the Visual Capitalist! The World's Carbon Emissions is a welcome addition to the library of the Visual Capitalist. With an annual world GHG emission inventory of around 47 billion metric tonnes of CO_2-e the carbon budget continues to be stretched.

Sector	Percentage GHG emissions	Sub-sector and mass of GHG emissions	
Agriculture and Forestry	15	Agricultural: 5.9 bn	Land use and forestry: 1.3 bn
Waste	3	1.7 bn	
Industrial	6	3.2 bn	
Energy	76	Electricity & Heat: 16.7 bn	Fugitive emissions: 3.1 bn

		Manu. & Construc. 6.3 bn	Military: 603 m
		Resid. and Comm. 3.2 bn	Transportation: 8.2 bn

- [Ember monthly wind and solar capacity data](): The good folk at **EMBER** publish data and information each month in respect of the development and deployment of photovoltaic solar and wind installations.

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* Michael Harrison is the primary author of **P_2N_0**, and editor. Any errors are Michael's. **P_2N_0** is written early each Saturday morning. In writing **P_2N_0**, Michael sources from original material. If a news item is covered broadly, the words **reported widely** connote that at least three sources have covered that news item, and **reported** connotes at least two sources. If there is only one source that is not the original material, that source is named.

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